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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/791,817	03/04/2004	Yui-Shin Fran	0941-0934P	3665
2292	7590	08/05/2005	EXAMINER	
BIRCH STEWART KOLASCH & BIRCH			DONG, DALEI	
PO BOX 747			ART UNIT	PAPER NUMBER
FALLS CHURCH, VA 22040-0747			2879	

DATE MAILED: 08/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

SF

Office Action Summary	Application No. 10/791,817	Applicant(s) FRAN ET AL	
	Examiner Dalei Dong	Art Unit 2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☒ Certified copies of the priority documents have been received in Application No. 10/011,281.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>3/4/2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 10/011,281, filed on December 11, 2001.

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Carbon Nanotube Field Emission Display Having Sub-arrays.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 and 3-5 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,417,606 to Nakamoto.

Regarding to claim 1, Nakamoto discloses in Figures 1, 2, 7 and 8, a cathode substrate of a carbon nanotube (CNT) field emission display, comprising: a glass substrate (701); a cathode layer (702) formed overlying the glass substrate (701), wherein the surface of the cathode layer (702) is defined as a plurality of electron-emitting areas spaced apart from each other; an insulating layer (704) formed overlying the glass substrate (701) and having an opening, wherein the opening exposes the cathode layer (702); a gate electrode (705) formed overlying the top of the insulating layer (704) and exposing the cathode layer (702); and a CNT structure (plurality of emitters 703) formed overlying the cathode layer (702), wherein CNT structure comprises a plurality of sub-CNT structures arranged in array (see column 6, lines 37-51 and column 8, line 66 to column 9, line 12); wherein, the sub-CNT structures (703) are formed overlying the plurality of electron-emitting areas respectively; and wherein, the sub-CNT structures (703) are spaced apart from each other without the insulating layer (704) therebetween.

Regarding to claim 3, Nakamoto discloses in Figures 1, 2, 7 and 8, the profile of the electron-emitting area (opening of the insulating layer) is quadrilateral circular or any other physical appearance.

Regarding to claim 4, Nakamoto discloses in Figures 1, 2, 7 and 8, a cathode substrate of a carbon nanotube (CNT) field emission display, comprising: a glass substrate (701); a cathode layer (702) formed overlying the glass substrate (701), wherein the surface of the cathode layer (702) is defined as a plurality of electron-emitting areas

spaced apart from each other, and the electron-emitting areas are uniform and arranged in array; an insulating layer (704) formed overlying the glass substrate (701) and having an opening, wherein the opening exposes the cathode layer (702); a gate electrode layer (705) formed overlying the top of the insulating layer (704) and exposing the cathode layer (702); and a CNT structure (plurality of emitters 703) formed overlying the cathode layer (702), wherein the CNT structure comprises a plurality of sub-CNT structure arranged in array (see column 6, lines 37-51 and column 8, line 66 to column 9, line 12); wherein, the sub-CNT (703) structures are formed overlying the plurality of electron-emitting areas respectively, such that an edge effect is formed at the periphery of each sub-CNT structures; and wherein, the sub-CNT structures (703) are spaced apart from each other without the insulating layers (704) therebetween.

Regarding to claim 5, Nakamoto discloses in Figures 1, 2, 7 and 8, the profile of the electron-emitting area (opening of the insulating layer) is quadrilateral circular or any other physical appearance.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2879

6. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,417,606 to Nakamoto in view of U.S. Patent No. 6,650,061 to Urayama.

Regarding to claim 2, Nakamoto discloses in Figures 1, 2, 7 and 8, a cathode substrate of a carbon nanotube (CNT) field emission display, comprising: a glass substrate (701); a cathode layer (702) formed overlying the glass substrate (701), wherein the surface of the cathode layer (702) is defined as a plurality of electron-emitting areas spaced apart from each other; an insulating layer (704) formed overlying the glass substrate (701) and having an opening, wherein the opening exposes the cathode layer (702); a gate electrode (705) formed overlying the top of the insulating layer (704) and exposing the cathode layer (702); and a CNT structure (plurality of emitters 703) formed overlying the cathode layer (702), wherein CNT structure comprises a plurality of sub-CNT structures arranged in array (see column 6, lines 37-51 and column 8, line 66 to column 9, line 12); wherein, the sub-CNT structures (703) are formed overlying the plurality of electron-emitting areas respectively; and wherein, the sub-CNT structures (703) are spaced apart from each other without the insulating layer (704) therebetween.

However, Nakamoto does not specifically disclose the interval of two adjacent electron-emitting areas is 80-150 microns.

Urayama teaches in Figures 4-6, a cathode substrate of a carbon nanotube (CNT) field emission display, comprising: a plurality of electron emitting areas (windows) and the interval of two adjacent electron-emitting areas is 200 microns (see column 8, line 55 to column 9, line 52) for the purpose of achieving maximum clarity and luminescence for the display device.

Nakamoto in view of Urayama discloses the claimed invention except for the interval of two adjacent electron-emitting areas is 80-150 microns. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have arranged the interval of the two adjacent electron-emitting areas of Nakamoto in the range of 80-150 microns in order to maximize the number of pixels in the display and thus maximize clarity and luminescence of the display device. Furthermore, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following prior art are cited to further show the state of the art of composition of a cathode substrate of a carbon nanotube field emission display.

U.S. Patent No. 5,588,893 to Kaftanov.

U.S. Patent No. 6,437,503 to Konuma.

U.S. Patent No. 6,525,453 to Cheng.

U.S. Patent No. 6,545,396 to Ohki.

U.S. Patent No. 6,664,727 to Nakamoto.

U.S. Patent No. 6,769,945 to Chang.

Art Unit: 2879

U.S. Patent Application No. 2004/0160161 to Song.

U.S. Patent Application No. 2004/0195950 to Ryu.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dalei Dong whose telephone number is (571)272-2370. The examiner can normally be reached on 8 A.M. to 5 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar Patel can be reached on (571)272-2457. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


D.D.

August 1, 2005


Joseph Williams
Primary Examiner
Art Unit 2879